

**IGS can
measure teeny
tiny sleeve
friction f_s**

IGS Technical Note

IGS has “shifted a paradigm” (again)

Conventional CPT compression cones, though great tools for many things, have a hidden dirty secret – they cannot reliably measure teeny tiny f_s values that one might associate with very soft natural soils, sediments and tailings; say stuff with shear strength below 10kPa or so. This is an industry “elephant in the room” – preferably not talked about much, if at all.

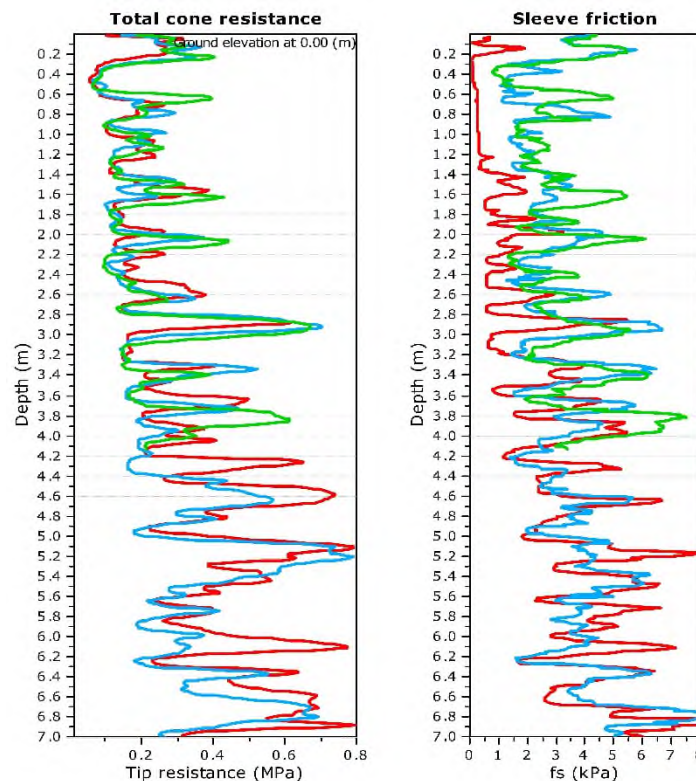
The cause is friction/stiction in seals inside the cone’s friction sleeve – these seals induce some small internal friction in this measuring system, and this has to be overcome before the sleeve can load its load cell and register the tiny forces involved in such measurements. This is most noticeable in tests where q_c is less than (say) 150-200kPa.

It matters not what capacity of cone is used, 100MPa, 25MPa or even 10MPa – the sleeve still has the seals and the small friction/stiction still applies.

See below - IGS has solved this problem

IGS conceived a solution, and our (wonderful) supplier Geomil built this for us; an innovative cone design using a different sleeve set-up and non-standard materials in the load cells. We are now able to repeatedly measure sleeve friction f_s values of < 1-2kPa.

this is a game changer



Notes

- (a) The red plots are from a very sensitive 10MPa compression cone; our previous best option.
- (b) The blue and green plots are from IGS’s new cones.
- (c) The three tests are within about 1.5m of each other, in very soft “ooze” like tailings.
- (d) All three cones are measuring similar f_s below about 4m depth; ie in materials with q_c of (say) 200kPa or greater.
- (e) The effect of the seal friction/stiction on f_s can be clearly seen in the red plot above 4m depth, in materials with q_c less than (say) 200kPa.

These new cones have now been used on several projects, including both tailings and very (extremely) soft natural clays. The results are consistent and repeatable. Note that calibration of these cones, for both q_c and f_s is done using dead weights.

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